

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in this application.

Listing of Claims:

Claim 1 (Original): A movement vector generating apparatus for generating a movement vector for a movement compensation by means of an inter-frame prediction, when encoding a preset image information including an image of a plurality of frames by using the movement compensation, said apparatus comprising:

a plurality of generating devices each for generating the movement vector corresponding to a search range and a search accuracy between one frame and another frame, for each pixel block which is located within said one frame respectively in the image information and includes a plurality of pixels, said generating devices respectively using search ranges different from each other and search accuracies different from each other; and

a selecting device for selecting one of movement vectors generated by said generating devices, in accordance with characteristics of the image in said each pixel block, and then outputting the selected movement vector corresponding to said each pixel block.

Claim 2 (Original): A movement vector generating apparatus according to Claim 1, wherein said generating devices comprise:

a first generator for generating a first movement vector, with a preset first range as the search range; and

a second generator for generating a second movement vector at the search accuracy lower than that of the first movement vector, with a preset second range wider than the first range as the search range.

Claim 3 (Original): A movement vector generating apparatus according to Claim 2, wherein said selecting device outputs the second movement vector as the selected movement vector if a length of the second movement vector is a length beyond the search range in the first

generating device, and outputs the first movement vector as the selected movement vector if the length of the second movement vector is a length belonging to the search range in the first generating device.

Claim 4 (Original): A movement vector generating apparatus according to Claim 2, wherein said selecting device comprises:

a first adding device for adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said first generating device, to generate a first absolute value sum;

a second adding device for adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block in said second generating device, to generate a second absolute value sum; and

a standardizing device for standardizing the generated first and second absolute value sums, respectively,

said selecting device comparing the standardized first absolute value sum with the standardized second absolute value sum, and outputting the second movement vector as the selected movement vector if the standardized first absolute value sum is greater than the standardized second absolute value sum.

Claim 5 (Previously Presented) A movement vector generating apparatus for generating a movement vector for a movement compensation by means of an inter-frame prediction, when encoding a preset image information including an image of a plurality of frames by using the movement compensation, said apparatus comprising:

a plurality of generating devices each for generating the movement vector corresponding to a search range and a search accuracy between one frame and another frame, for each pixel block which is located within said one frame respectively in the image information and includes a plurality of pixels, said generating devices respectively using search ranges different from each other and search accuracies different from each other; and

a selecting device for selecting one of movement vectors generated by said generating devices, in accordance with characteristics of the image in said each pixel block, and then outputting the selected movement vector corresponding to said each pixel block,

wherein said generating devices comprise:

a first generator for generating a first movement vector, with a preset first range as the search range; and

a second generator for generating a second movement vector at the search accuracy lower than that of the first movement vector, with a preset second range wider than the first range as the search range, and

wherein said selecting device comprises:

a first adding device for adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said first generating device, to generate a first absolute value sum;

a second adding device for adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said second generating device, to generate a second absolute value sum; and

a standardizing device for standardizing the generated first and second absolute value sums, respectively,

said selecting device comparing the standardized first absolute value sum with the standardized second absolute value sum, outputting the first movement vector as the selected movement vector if a difference between the standardized first absolute value sum and the standardized second absolute value sum is not greater than a predetermined threshold which is set in advance to detect a difference between the first movement vector and the second movement vector at a high accuracy, and outputting the second movement vector as the selected movement vector if the difference between the standardized first absolute value sum and the standardized second absolute value sum is greater than the predetermined threshold.

Claim 6 (Original): A movement vector generating apparatus according to Claim 2, wherein said selecting device outputs one of the first and second movement vectors which is

closer to the selected movement vector corresponding to another pixel block located adjacent to one pixel block as the selected movement vector corresponding to said one pixel block from which the first movement vector and the second movement vector are generated.

Claim 7 (Original): An image encoding apparatus comprising:

(a) a movement vector generating apparatus for generating a movement vector for a movement compensation by means of an inter-frame prediction, when encoding a preset image information including an image of a plurality of frames by using the movement compensation, said apparatus comprising:

C 1 a plurality of generating devices each for generating the movement vector corresponding to a search range and a search accuracy between one frame and another frame, for each pixel block which is located within said one frame respectively in the image information and includes a plurality of pixels, said generating devices respectively using search ranges different from each other and search accuracies different from each other; and

a selecting device for selecting one of movement vectors generated by said generating devices, in accordance with characteristics of the image in said each pixel block, and then outputting the selected movement vector corresponding to said each pixel block,

(b) a compensating device for performing the movement compensation on the basis of the selected movement vector outputted from the selecting device, to output a compensation signal, and

(c) an encoding device for encoding the image information on the basis of the compensation signal.

Claim 8 (Original): A movement vector generating method of generating a movement vector for a movement compensation by means of an inter-frame prediction, when encoding a preset image information including an image of a plurality of frames by using the movement compensation, said method comprising:

a plurality of generating processes each of generating the movement vector corresponding to a search range and a search accuracy between one frame and another frame, for each pixel block which is located within said one frame respectively in the image information

and includes a plurality of pixels, said generating processes respectively using search ranges different from each other and search accuracies different from each other; and

a selecting process of selecting one of movement vectors generated by the generating processes, in accordance with characteristics of the image in said each pixel block, and then outputting the selected movement vector corresponding to said each pixel block.

Claim 9 (Original): A movement vector generating method according to Claim 8, wherein said generating processes comprise:

a first generating process of generating a first movement vector, with a preset first range as the search range; and

a second generating process of generating a second movement vector at the search accuracy lower than that of the first movement vector, with a preset second range wider than the first range as the search range.

Claim 10 (Original): A movement vector generating method according to Claim 9, wherein said selecting process outputs the second movement vector as the selected movement vector if a length of the second movement vector is a length beyond the search range in the first generating process, and outputs the first movement vector as the selected movement vector if the length of the second movement vector is a length belonging to the search range in the first generating process.

Claim 11 (Original): A movement vector generating method according to Claim 9, wherein said selecting process comprises:

a first adding process of adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said first generating device, to generate a first absolute value sum;

a second adding process of adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said second generating device, to generate a second absolute value sum; and

a standardizing process of standardizing the generated first and second absolute value sums, respectively,

said selecting process comparing the standardized first absolute value sum with the standardized second absolute value sum, and outputting the second movement vector as the selected movement vector if the standardized first absolute value sum is greater than the standardized second absolute value sum.

12. (Previously Presented) A movement vector generating method of generating a movement vector for a movement compensation by means of an inter-frame prediction, when encoding a preset image information including an image of a plurality of frames by using the movement compensation, said method comprising:

② a plurality of generating processes each for generating the movement vector corresponding to a search range and a search accuracy between one frame and another frame, for each pixel block which is located within said one frame respectively in the image information and includes a plurality of pixels, said generating processes respectively using search ranges different from each other and search accuracies different from each other; and

a selecting process of selecting one of movement vectors generated by the generating processes, in accordance with characteristics of the image in said each pixel block, and then outputting the selected movement vector corresponding to said each pixel block,

wherein said generating processes comprise:

a first generating process of generating a first movement vector, with a preset first range as the search range; and

a second generating process of generating a second movement vector at the search accuracy lower than that of the first movement vector, with a preset second range wider than the first range as the search range, and

wherein said selecting process comprises:

a first adding process of adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said first generating device, to generate a first absolute value sum;

a second adding process of adding together absolute values of differences between respective one of the pixels in the pixel block and its corresponding pixel in the frame targeted by the movement compensation, as for all of the pixels in the pixel block, in said second generating device, to generate a second absolute value sum; and

a standardizing process of standardizing the generated first and second absolute value sums, respectively,

said selecting process comparing the standardized first absolute value sum with the standardized second absolute value sum, outputting the first movement vector as the selected movement vector if a difference between the standardized first absolute value sum and the standardized second absolute value sum is not greater than a predetermined threshold which is set in advance to detect a difference between the first movement vector and the second movement vector at a high accuracy, and outputting the second movement vector as the selected movement vector if the difference between the standardized first absolute value sum and the standardized second absolute value sum is greater than the predetermined threshold.

Claim 13 (Original): A movement vector generating method according to Claim 9, wherein said selecting process outputs one of the first and second movement vectors which is closer to the selected movement vector corresponding to another pixel block located adjacent to one pixel block as the selected movement vector corresponding to said one pixel block from which the first movement vector and the second movement vector are generated.

Claim 14 (Original): An image encoding method comprising

(a) a movement vector generating method of generating a movement vector for a movement compensation by means of an inter-frame prediction, when encoding a preset image information including an image of a plurality of frames by using the movement compensation, said method comprising:

a plurality of generating processes each of generating the movement vector corresponding to a search range and a search accuracy between one frame and another frame, for each pixel block which is located within said one frame respectively in the image information and includes a plurality of pixels, said generating processes respectively using search ranges different from each other and search accuracies different from each other; and

a selecting process of selecting one of movement vectors generated by the generating processes, in accordance with characteristics of the image in said each pixel block, and then outputting the selected movement vector corresponding to said each pixel block,

(b) a compensating process of performing the movement compensation on the basis of the selected movement vector outputted from the selecting process, to output a compensation signal, and

(c) an encoding process of encoding the image information on the basis of the compensation signal.

Claim 15 (Previously Presented): A movement vector generating apparatus for an image encoding system, comprising:

two or more vector generators each of which generates a movement vector indicative of movement of a pixel block from one frame to another, the vector generators having different search ranges and accuracies; and

e' a selecting device for selecting, based on image characteristics of the pixel block, one of the movement vectors generated by the vector generators for use in a movement compensating process of the image encoding system.

Claim 16 (Previously Presented): A movement vector generating apparatus according to Claim 15, wherein the selecting device comprises a comparator for comparing the search range of one of the vector generators and the length of the movement vector generated by another one of the vector generators in order to select one of the movement vectors.

Claim 17 (Previously Presented): A movement vector generating apparatus according to Claim 15, wherein the selecting device comprises a comparator for comparing a sum of absolute values of pixel differences calculated by one of the vector generators with a sum of absolute values of pixel differences calculated by another one of the vector generators in order to select one of the movement vectors.

Claim 18 (Previously Presented): A movement vector generating apparatus according to Claim 15, wherein the selecting device comprises a comparator for comparing the movement

vectors generated by the vector generators with a pre-generated movement vector in order to select one of the movement vectors.

Claim 19 (Previously Presented): A movement vector generating apparatus according to Claim 15, comprising three or more vector generators.

Claim 20 (Previously Presented): A movement vector generating process for an image encoding system, comprising:

two or more vector generating processes each of which generates a movement vector indicative of movement of a pixel block from one frame to another, the vector generating processes having different search ranges and accuracies; and

a selecting process for selecting, based on image characteristics of the pixel block, one of the movement vectors generated by the vector generating processes for use in a movement compensating process of the image encoding system.

Claim 21 (Previously Presented): A movement vector generating process according to Claim 20, wherein the selecting process compares the search range of one of the vector generating processes and the length of the movement vector generated by another one of the vector generating processes in order to select one of the movement vectors.

Claim 22 (Previously Presented): A movement vector generating process according to Claim 20, wherein the selecting process compares a sum of absolute values of pixel differences calculated by one of the vector generating processes with a sum of absolute values of pixel differences calculated by another one of the vector generating processes in order to select one of the movement vectors.

Claim 23 (Previously Presented): A movement vector generating process according to Claim 20, wherein the selecting process compares the movement vectors generated by the vector generating processes with a pre-generated movement vector in order to select one of the movement vectors.

Claim 24 (Previously Presented): A movement vector generating process according to Claim 20, comprising three or more vector generating processes.

Claim 25 (New): A movement vector generating apparatus for generating a movement vector for use in a movement compensating process of an image encoding system, comprising:

two or more movement vector generators each of which uses different search criteria to generate a respective movement vector indicative of movement of the same pixel block from one frame to another; and

a selecting device for selecting, based on image characteristics of the pixel block, one of the movement vectors generated by the movement vector generators and outputting only the selected movement vector for use in the movement compensating process of the image encoding system.

Claim 26 (New): A movement vector generating apparatus according to Claim 25, wherein the selecting device comprises a comparator for comparing the search range of one of the movement vector generators and the length of the movement vector generated by another one of the movement vector generators in order to select one of the movement vectors.

Claim 27 (New): A movement vector generating apparatus according to Claim 25, wherein the selecting device comprises a comparator for comparing a sum of absolute values of pixel differences calculated by one of the movement vector generators with a sum of absolute values of pixel differences calculated by another one of the movement vector generators in order to select one of the movement vectors.

Claim 28 (New): A movement vector generating apparatus according to Claim 25, wherein the selecting device comprises a comparator for comparing the movement vectors generated by the movement vector generators with a pre-generated movement vector in order to select one of the movement vectors.

Claim 29 (New): A movement vector generating apparatus according to Claim 25, comprising three or more movement vector generators.

Claim 30 (New): A movement vector generating process for generating a movement vector for use in a movement compensating process of an image encoding system, comprising:

two or more movement vector generating processes each of which uses different search criteria to generate a respective movement vector indicative of movement of the same pixel block from one frame to another; and

a selecting process for selecting, based on image characteristics of the pixel block, one of the movement vectors generated by the movement vector generating processes and outputting only the selected movement vector for use in the movement compensating process of the image encoding system.

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Claim 31 (New): A movement vector generating process according to Claim 30, wherein the selecting process compares the search range of one of the movement vector generating processes and the length of the movement vector generated by another one of the movement vector generating processes in order to select one of the movement vectors.

Claim 32 (New): A movement vector generating process according to Claim 30, wherein the selecting process compares a sum of absolute values of pixel differences calculated by one of the movement vector generating processes with a sum of absolute values of pixel differences calculated by another one of the movement vector generating processes in order to select one of the movement vectors.

Claim 33 (New): A movement vector generating process according to Claim 30, wherein the selecting process compares the movement vectors generated by the movement vector generating processes with a pre-generated movement vector in order to select one of the movement vectors.

Claim 34 (New): A movement vector generating process according to Claim 30, comprising three or more movement vector generating processes.